

## Health Effects of Ownership of and Attachment to Companion Animals in an Older Population

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**Background:** Two reasons for the inconclusiveness of the literature on the health effects of pet ownership are (1) failure to control for other known influences on health, and (2) inadequate consideration of the nature of the emotional relationship between owners and their companion animals. **Purpose:** The main aims were to develop a measure of pet attachment that reflects psychologists' use of the attachment concept, and to see if pet ownership or attachment added to the health variance explained by known predictors. **Method:** Community-living older adults ( $n = 314$ ) gave information by interview using structured questions and standardized scales. Multiple regressions were then conducted to examine the possible predictive role of health habits, human social supports, pet ownership, and owners' attachment to the pet, on health and well-being. **Results:** The pet attachment measure showed good internal reliability. After controlling for other variables, neither pet ownership nor pet attachment added significantly to explained variance in health and well-being. **Conclusions:** The health of elderly people is related to their health habits and social supports but not to their ownership of, or attachment to, a companion animal.

*Key words:* human-animal bond, pets, health, social support, emotional bonds

The scientific literature about the health effects of companion animals is inconsistent in its conclusions. A number of studies associate pets with physical and psychological benefits to their owners' health ranging from increased exercise, improved general and cardiovascular health, less use of general practitioner services, fewer falls, and stimulation of daily activity in elderly owners (Brown & Rhodes, 2006; Friedmann, Thomas, & Eddy, 2000; Motooka, Koike, Yokoyama, & Kennedy, 2006; Pachana, Ford, Andrew, & Dobson, 2005; Raina, Waltner-Toews, Bonnett, Woodward, & Abernathy, 1999; Wells, 2007). Raina et al. (1999) and Brown and Rhodes (2006) found that elderly dog owners participated in more physical activity than those who owned other pets, while McNicholas and Collis (2000) reported a robust finding that dogs act as a facilitator for human interaction. Fewer depressive symptoms may arise as an outcome of companion animals enhancing social interaction between peo-

ple (Beck & Meyers, 1996; Brown & Rhodes, 2006; McNicholas et al., 2005; Miller, Staats, & Partlo, 1992). Pet owners customarily report benefits to their well-being such as ongoing reciprocal affection, companionship, and a sense of protection (McNicholas et al., 2005; Podberscek, 2006). Companion animals have been claimed to protect against boredom, loneliness, and helplessness in hospital and nursing home settings and to benefit people with physical disabilities, epilepsy, aphasia, and psychiatric illness (Banks, Gonser & Banks, 2001; Guay, 2001; Macauley, 2006; Ormerod, Edney, Foster, & Whyham, 2005). Pets are reported to provide a sense of purpose, security, belonging, family, and self-identity, as well as motivate their older owners to engage in daily activity, thus enhancing personal value and worth (Bonas, McNicholas, & Collis, 2000; Enders-Slegers, 2000; Macauley, 2006; McNicholas et al., 2005; Pachana et al., 2005).

Other researchers have drawn attention to negative health states associated with pet ownership. Parslow and Jorm (2003) found that pet owners were more likely to smoke and have higher body mass index and blood pressure levels than non-pet owners. Parslow, Jorm, Christensen, Rodgers, and Jacomb (2005) concluded that pets made no difference to psychological or physical well-being in community-dwelling older people. In fact, caring for a pet was associated with symptoms of depression and poorer physical health, particularly for married, female pet owners. A recent

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cross-sectional and longitudinal study of older people by Thorpe et al. (2006) found that although dogs appear to facilitate walking behavior in older owners, the mobility gained from dog ownership was similar to that associated with any walking. Kurrie, Day, and Cameron (2004) detailed how companion animals pose hazards for older owners, and Pluijm et al. (2006) suggest that the presence of cats or dogs in the household is a predictor of falls and fractures. Additionally, some owners develop allergies to their pets, with symptoms including rashes, hay fever, diarrhea, and asthma, and a small risk exists of acquiring zoonoses and infections from companion animals (Guay, 2001; Rich & Roberts, 2006).

Much of the research is anecdotal or methodologically weak and should be viewed with caution (Beck & Katcher, 2003; Miller et al., 1992; Pachana et al., 2005). There is a dearth of randomized control studies and even of multivariate studies which consider other possible influences on health such as health habits and human sources of emotional support. Level of human attachment to the pet may act as a mediating variable, and the failure to measure it may explain some of the discrepancies in the research findings (Crawford, Worsham, & Swinehart, 2006; McNicholas et al., 2005; Miller et al., 1992; Parslow et al., 2005; Staats, Miller, Carnot, Rada, & Turnes, 1996). Pachana et al. (2005) acknowledged that attachment to pets was an important variable that should have been assessed in their study. Another term for this emotionally positive relationship is the human-companion animal bond, which, as noted, has been reported as beneficial for health and mental health in older people (Garrity, Stallones, Marx, & Johnson, 1987; Stallones, Marx, Garrity, & Johnson, 1990).

There has been a more or less implicit assumption that the human-animal bond is a form of emotional attachment with the same benefits as close human relationships (Bonas et al., 2000; McNicholas & Collis, 2006). However, Crawford et al. (2006) propose that the term "attachment" utilized to measure human-companion animal relationships in current research, while it may share attributes of traditional attachment theory (Bowlby, 1969), fails to reflect attachment theory comprehensively. Previous pet attachment measurement scales have not necessarily been psychologically meaningful. For example, some combine questions about emotional relations between the pet and the owner, with questions about being responsible for the animal's care or sharing activities and food (Anderson, 2006). One goal of the current study was to trial a psychologically meaningful measure of the human-companion animal relationship with a focus on its attachment components.

There is a large literature supporting the psychological and health benefits of close, reciprocal relationships with human confidants. Such social supports enhance

quality of life, while inadequate supports or loneliness are associated with depression and constitute a risk factor for cardiovascular disease (Bunker et al., 2003; National Heart Foundation of Australia, 2004) and lower quality of life in those coping with serious or chronic illness (Helgeson, Snyder, & Seltman, 2004; Hewitt, Herdman, & Holland, 2004; Rehse & Pukrop, 2003; Simoni, Frick, & Huang, 2006; Symister & Friend, 2003). Because of the problems in measuring pet attachment, little is known about the relationship, if any, between attachment to pets and closeness of human relationships (Paul, 2000). Garrity et al. (1987) showed that strong attachment to a pet is linked with less depression and loneliness, but only when pet owners had few human confidants; similar findings in a follow-up study by Stallones et al. (1990) demonstrated that older owners highly attached to their pets also had fewer human social supports.

Where pets are regarded as equal family members, pet death or illness, or separation from a cherished pet can be extremely distressing for older pet owners (Clements, Benasutti, & Carmone, 2003; Enders-Slegers, 2000; McNicholas et al., 2005; Morley & Fook, 2005; Planchon, Templer, Stokes, & Keller, 2002; Podberscek, 2006; Podrazik, Shackford, Becker, & Heckert, 2000; Sharkin & Knox, 2003; Turner, 2005). Older people have been reported to remain in unsuitable accommodations because of their pets' needs, or refuse to comply with medical advice or treatment from fear of separation from their pet (McNicholas et al., 2005; Morley & Fook, 2005; Podberscek, 2006). Therefore, there are several ways in which attachment to pets could damage health: through interfering with human relationships, through causing pathological grief upon separation, and through interfering with health care. The present study provided an opportunity to investigate possible negative effects of extreme attachment to pets in older people, while taking into account their human social supports.

The aims of the present project are (1) to explore the psychometric properties of a more theory-grounded pet attachment measure; (2) to explore attachment as a mediating variable between companion animal ownership and health in older pet owners, while controlling for other variables known to influence health; and (3) to examine the relationship between strength of attachment to pet and satisfaction with human social supports.

## Method

### Participants

Participants were a convenience sample of English-speaking adults age 60+ years who lived independently in the community, were not acutely ill when recruited, and who gave fully informed consent to answer some questions about their health and well-being.

Ethics approval for the project was gained through the relevant institutional committee.

A total of 314 individuals agreed to provide information. Of these, 130 (41.5%) were male (average age 71.1 years,  $SD = 8.32$ ), and 182 (58.5%) were female (average age 71.6 years,  $SD = 8.58$ ). A total of 179 (57%) were pet owners. No information was collected about the number or characteristics of those who declined to participate. Some comparisons were possible on demographic and health measures between participants and those of the same age group in a large regular telephone survey conducted every month by the state Department of Health of a representative sample of the population (<http://www.health.sa.gov.au/pros/Default.aspx?tabid=37>). In 2006, the year the present study occurred, the South Australian Monitoring and Surveillance System surveyed 1423 adults age 60+ years, 651 (45.7%) of whom were males (average age 70.8 years,  $SD = 7.75$ ) and 772 (54.3%) were female (average age 72.6 years,  $SD = 8.43$ ). University degrees had been obtained by 23.9% of participants in the current sample compared with 10.9% of the state sample, but in other ways the current sample is more representative, with 31.3% living alone vs. 27.9% for the state sample, 10.3% vs. 8.2% in full-time employment, 89.2% vs. 92.3% non-smokers, and 34.4% vs. 39.4% having 21+ min exercise per day. For self-reported general health, 37.4% of the current sample vs. 42.2% of the state sample rated their health as very good or excellent.

### Measures

Demographic variables included age in years, gender, highest education level (secondary school, trade or vocational certificate/diploma, university degree), living arrangements (living alone, with partner only, in household of 3+ people), and paid employment (unemployed or retired, part-time work, full-time work). Health habits were assessed by two questions: smoking (no, 1–15, or 16+ cigarettes per day) and exercise (0–10 min per day, 11–20 min per day, 21+ min per day).

An adapted form of the Multi-Dimensional Support Scale (MDSS; Winefield, Winefield, & Tiggemann, 1992) measured respondents' satisfaction with social support from family and close friends and from health professionals. The MDSS enquires about social support in three forms (emotional, practical, informational) and from various potential sources (e. g., confidants, peers, experts). It has been used in numerous health psychology research projects and demonstrates good reliability and validity. The modification used in this study focused on adequacy rather than availability, as perceived adequacy of support is the crucial dimension associated with health outcomes (Winefield, Coventry, Lewis, & Harvey, 2003). As different po-

tential sources of support can be expected to provide different kinds and forms of support, separate scales are used; in this sample of older members of the community, the relevant sources were seen as confidants and health professionals. Thus, the first scale (confidants support) referred to "your family and friends, especially those who are most important to you," and the second (health professional support) referred to "the health professionals who take care of you, including your GP and any specialists you've seen recently." Items referred to emotional support, practical assistance, and informational support and were scored with a simple rating system (1 = Not enough, 2 = They're OK, 3 = Very satisfactory). In this sample Cronbach's alpha coefficient of internal reliability was .89 for confidant support (6 items, range 6–18) and .88 for health professional support (5 items, range 5–15).

For pet owners, type of pet was recorded as cat, dog, or other. The Owner-Pet Relationship (OPR) questionnaire developed for this project combined new items, which reflected emotional support, proximity-seeking, and reciprocity with others chosen from existing scales by Stallones et al. (1990) and Staats et al. (1996). Item choice was based on attachment theory (Bowlby, 1969; Goodwin, 2003) and thus focused on the owner's wish to maintain nearness to the companion animal, and perception of the relationship as emotionally supportive and reciprocal. The 15 items used in this study are shown in Table 1, with their response alternatives that were scored 1–4 in the direction of greater attachment, except Q3 where true = 4, not true = 1. Total score range = 15–60. Owners with more than one companion animal in the household were asked to respond with regard to "the one you feel closest to."

Health outcomes were assessed using the SF-36 Health Survey, a widely used, comprehensive, and valid 36-item measure (Keller et al., 1998; Ware 1987). Eight subscales provide scores for physical functioning, role disability due to physical problems, bodily pain, general health perceptions, vitality, social functioning, role disability due to emotional problems, and general mental health.

### Procedure

Third-year psychology students collected data as part of their course requirements. They each interviewed 3–4 people age 60+ years who were not members of their immediate family, using the measures described above, and then entered results into an online data base. Because of the focus on pet ownership in their project, students somewhat oversampled pet owners who constituted 57% of this sample compared with 48.6% of the 60- to 64-year-olds in Parslow et al.'s (2005) survey. After checking and cleaning the data, the authors conducted statistical analyses using SPSS.

**Table 1.** Items, Scoring, and Mean Scores for the Owner-Pet Relationship Scale in Community-Living Pet Owners Age 60+ Years ( $n = 179$ )

| Item Wording and Scoring  | <i>M</i> | <i>SD</i> |
|---|----------|-----------|
| 1. I want to take my pet along when I go to visit friends or relatives.<br><i>Never / sometimes / usually / always</i>                                  | 1.78     | .93       |
| 2. Pets should have the same rights and privileges as family members.<br><i>Strongly disagree / disagree / agree / strongly agree</i>                   | 2.68     | .85       |
| 3. I have a photo of my pet in my purse or wallet, or on display in my office or home.<br><i>True / not true</i>  | 2.27     | 1.49      |
| 4. My pet is more loyal to me than the people in my life.<br><i>Strongly disagree / disagree / agree / strongly agree</i>                               | 2.20     | .77       |
| 5. My pet helps me get through tough times.<br><i>Never / sometimes / usually / always</i>  | 2.65     | .95       |
| 6. My pet gives me a reason for getting up in the morning.<br><i>Strongly disagree / disagree / agree / strongly agree</i>                              | 2.61     | .89       |
| 7. My pet is like a member of the family.<br><i>Strongly disagree / disagree / agree / strongly agree</i>   | 3.27     | .70       |
| 8. My feelings toward other people are affected by how they react to my pet.<br><i>Never / sometimes / usually / always</i>                             | 2.03     | .89       |
| 9. My pet knows when I'm upset and tries to comfort me.<br><i>Never / sometimes / usually / always</i>  | 2.47     | 1.02      |
| 10. My pet enjoys my company.<br><i>Never / sometimes / usually / always</i>  | 3.34     | .84       |
| 11. My pet relies on me for love and care.<br><i>Never / sometimes / usually / always</i>   | 3.48     | .73       |
| 12. I love my pet.<br><i>Strongly disagree / disagree / agree / strongly agree</i>  | 3.53     | .59       |
| 13. I think about my pet when it is not with me.<br><i>Never / sometimes / usually / always</i>   | 2.44     | .90       |
| 14. I do not like leaving my pet in someone else's care if I go interstate or overseas.<br><i>Strongly disagree / disagree / agree / strongly agree</i> | 2.58     | .95       |
| 15. I have gotten to know other people through having this pet.<br><i>Never / occasionally / quite often / frequently</i>                               | 2.09     | .97       |
| TOTAL   | 39.32    | 9.31      |

Hierarchical multiple regressions were conducted to check the amount of additional variance explained by pet ownership and attachment, after taking account of the contribution of demographic variables, health habits (smoking and exercise), and human social supports.

### Results

Prior to analysis, data were examined for accuracy of data entry, missing values, and match with the assumptions of univariate analysis. Missing values were few, and cases with more than one missing value were counted as missing. The eight SF-36 totals showed outliers, but as there was nothing unusual about the cases apart from the extremely high or low scores on views about health, the scores were kept in the analyses. Extremely high scores were adjusted one unit above the next highest score in the sample, which was not an extreme score, and extremely low scores were adjusted to one unit below the next lowest score in the sample, which was not an extreme score, in order to reduce impact on the mean (Tabachnick & Fidell, 2006).

### Pet Owner Characteristics

Pet owners ( $n = 179$ ) compared with non-owners ( $n = 135$ ) did not differ significantly in sex or education, but were younger (means 69.5 and 73.9 years, respectively,  $t(311) = 4.73$ ,  $p < .01$ ), more likely to be living in a larger household ( $\chi^2 = 6.49$ ,  $df = 2$ ,  $p < .05$ ), and less likely to be unemployed/retired ( $\chi^2 = 7.63$ ,  $df = 2$ ,  $p < .05$ ). Cat owners ( $n = 52$ ) were somewhat older than dog owners ( $n = 99$ ), means 71.6 and 68.1 years, respectively,  $t(149) = 2.79$ ,  $p < .01$ , but did not differ in amount of exercise taken.

### Psychometric Properties of the OPR Questionnaire

Mean scores per item and overall total scores are shown in Table 1. Total scores were normally distributed with an average indicating moderate attachment. Internal reliability was assessed using Cronbach's alpha coefficient and was found to be high ( $\alpha = .92$ ). Deletion of any item would have lowered the alpha. As the scale had been designed to measure the

**Table 2.** Associations (Pearson's *r*) between Demographic Variables, Health Habits, Social Supports, Pet Attachment, and Health (SF-36 Scales) in Older People (*n* = 314)

| Demographic Items & Subscale Totals | Physical Function | Role-Physical | Bodily Pain | General Health | Vitality | Social Function | Role-Emotion | Mental Health |
|-------------------------------------|-------------------|---------------|-------------|----------------|----------|-----------------|--------------|---------------|
| Age                                 | -.45**            | -.18**        | -.18*       | -.18**         | -.14*    | -.04            | .14*         | .07           |
| Sex (M/F)                           | -.09              | .00           | -.03        | -.01           | -.09     | -.12*           | -.15**       | -.11*         |
| Education                           | .23**             | .08           | .01         | .10            | .06      | .13*            | .04          | .05           |
| Living                              | .12*              | -.03          | .01         | -.01           | -.00     | -.02            | -.05         | .01           |
| Employ                              | .35**             | .24**         | .18**       | .22**          | .10      | .15**           | -.02         | -.01          |
| Smoking                             | -.02              | -.00          | -.11        | -.11           | -.07     | -.05            | -.05         | -.11*         |
| Exercise                            | .55**             | .34**         | .20**       | .45**          | .37**    | .32**           | .12*         | .20*          |
| Support (friends)                   | .08               | .10           | .10         | .24**          | .32**    | .32**           | .28**        | .45**         |
| Support (GP)                        | .17**             | .14*          | .13*        | .27**          | .28**    | .27**           | .11          | .26**         |
| Pet attachment <i>n</i> = 179       | .02               | .05           | .06         | -.02           | .02      | -.16*           | -.19*        | -.06          |

\**p* < .05, \*\**p* < .01.

established theoretical construct of attachment, a principal axis factor analysis was conducted (Tabachnick & Fidell, 2006). Two factors with eigenvalues of 7.11 and 1.27 were extracted and explained 44.2% and 5.4% of the variance, respectively. All 15 items of the OPR scale loaded at .55 or higher on the first factor, and only one loaded at .40 or higher on the second factor; a forced one-factor solution explained 43.8% of the variance. An oblique rotation produced 11 items loading at .40 or higher on the first factor and four on the second; however, the second factor was not readily interpretable. The evidence for a second factor is therefore weak, and the scale can appropriately be regarded as measuring one variable (theory-based attachment to pet) and the total raw score as an indicator of the strength of that variable.

Pet attachment as measured by the OPR was not significantly correlated with age (*r* = -.01, *p* > .05), employment status (*r* = .03, *p* > .05), or health habits: smoking (*r* = .01, *p* > .05) and exercise (*r* = -.003, *p* > .05). Pet attachment was higher in females (mean 40.9, *SD* = 8.96) than in males (mean 37.3, *SD* = 9.42; *t*(176) = 2.63, *p* < .01). The average attachment to pet was higher for the 100 dog owners (mean 41.9, *SD* = 8.79) than for the 52 cat owners (mean 37.1, *SD* = 8.85) or the 27 "other" (mainly birds) pet owners (mean 32.4, *SD* = 8.02; *F*(2, 176) = 13.51, *p* < .01).

**Predictors of Health**

Table 2 shows zero-order correlations between demographic variables, health habits, and social supports with the eight SF-36 scales. Younger age, employment, exercise, and satisfactory social supports (especially from health professionals) were all, as expected, strongly associated with health. As some of these differed by pet ownership status and level of pet attachment, multivariate analyses were needed to examine the relative roles of different sets of variables.

Tables 3 and 4 summarize two series of hierarchical multiple regressions conducted to provide information about the contribution to health of pet ownership *per se* (Table 3, with all participants) and pet attachment (Table 4, with pet owners only), after controlling for demographic, health habit, and social support variables. Overall, it can be seen that demographic and health habit variables account for most of the explained variance in the more physically oriented health scales, and social supports explain more variance in the more psychologically oriented health scales. After taking those into account, neither pet ownership nor attachment made significant contributions to explained variance in any measure of health.

**Relationship between Human Social Supports and Pet Attachment**

There was no apparent association between human (confidant) social supports and pet attachment, whether linear (*r* = -.06, *p* > .05) or nonlinear (by inspection of the scattergram).

**Table 3.** Determinants of Health in Older People: Hierarchical Regressions Controlling for Demographic Variables, Health Habits, and Social Supports. Does Pet Ownership Add to Explained Variance? (*n* = 314)

| SF-36 Scale          | Demographics | Health Habits | Social Support | Pet/No Pet |
|----------------------|--------------|---------------|----------------|------------|
| Physical Functioning | .24**        | .43**         | .44            | .44        |
| Role-Physical        | .06**        | .14**         | .15            | .15        |
| Bodily Pain          | .02          | .06*          | .07            | .06        |
| General Health       | .05*         | .21**         | .28**          | .28        |
| Vitality             | .02          | .13**         | .23**          | .23        |
| Social Functioning   | .03*         | .12**         | .23**          | .24        |
| Role-Emotional       | .03          | .05           | .10**          | .10        |
| Mental Health        | .00          | .05**         | .24**          | .23        |

Note. Hierarchical regression analysis used to show increments of change. Values represent adjusted *R*<sup>2</sup> statistic. Significance of the *F* to change at each step: \**p* < .01, \*\**p* < .001.

**Table 4.** *Determinants of Health in Older Pet Owners: Hierarchical Regressions Controlling for Demographic Variables, Health Habits, and Social Supports. Does Owner's Attachment to Pet Add to Explained Variance? (n = 179)*

| SF-36 Scale          | Demographics | Health Habits | Social Support | Pet/No Pet |
|----------------------|--------------|---------------|----------------|------------|
| Physical Functioning | .20**        | .34**         | .34            | .34        |
| Role-Physical        | .02          | .09**         | .10            | .09        |
| Bodily Pain          | .01          | .04           | .06            | .06        |
| General Health       | .03          | .21**         | .27**          | .27        |
| Vitality             | .01          | .13**         | .23**          | .23        |
| Social Functioning   | -.01         | .09**         | .21**          | .22        |
| Role-Emotional       | .07*         | .08           | .15**          | .17        |
| Mental Health        | -.01         | .03           | .18**          | .17        |

Note. Hierarchical regression analysis used to show increments of change. Values represent adjusted  $R^2$  statistic. Significance of the  $F$  to change at each step: \* $p < .01$ , \*\* $p < .001$ .

## Discussion

The study sought to explore health predictors in older adults specifically with regard to pet ownership and, for pet owners, the quality of emotional attachment to the animal. Participants were a convenience sample of community-living adults age 60+ years, who although more highly educated, were similar in age, sex ratio, living conditions, employment, health habits, and general health perceptions to a large representative sample of the South Australian population age 60+ that year. The brief Owner-Pet Relationship scale developed for this study as psychologically meaningful in terms of attachment theory was well-accepted by respondents, demonstrated good internal reliability, and showed consistent loadings of all items on a single factor.

An advance in clarifying the inconsistent literature about the health effects of pets was possible by controlling for other known predictors of health. Taking account of age, sex, other demographic variables, health habits (smoking and exercise), and adequacy of social supports from both confidants and health professionals, neither pet ownership nor pet attachment added anything significant to the explained variance in health scale scores. Generalizations about the health benefits of pets are thus unwarranted on the basis of these results. Enthusiastic prescriptions for older people to have free access to pets and veterinary care for them (e. g., Headey, 1999) receive no justification from this research. On the contrary, encouragement to engage in daily exercise seems, from our results, to be a better public health investment (Thorpe et al., 2006; Trolle-Lagerros et al., 2005).

Pet attachment was not related to satisfaction with human supports, although a study focusing on older people with high pet attachment and inadequate social support might be useful to explore the effects of

high pet attachment in more depth. The findings may also have implications for the veterinary profession, whose members' communication skills and capacity to recognize and respond appropriately to psychological distress will be tested by some pet owners. There is relatively little in the veterinary science literature about the veterinarian-client relationship, how veterinarians achieve good vet-client communication, or what communication and counseling skills training veterinarians do or should receive, either as students or through continuing professional development (Martin & Taunton, 2006; Shaw, Bonnett, Adams, & Roter, 2006).

In the absence of randomized control trials with their practical and ethical difficulties, methodologically stronger studies of the possible relationship between pet ownership and owner health can use comparison (albeit self-selected) non-owner samples and multivariate analyses, which take account of other known predictors of health. Our results do not negate previous findings that the health of some older people may benefit greatly from owning or acquiring a companion animal. However, our findings do suggest that pet ownership is not necessarily beneficial, whereas exercise and satisfying relationships with human support sources are reliably related to good health.

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